

OWNER'S MANUAL

20-113

PRO-2021 PROGRAMMABLE SCANNER
AM/FM Monitor Receiver
VHF:30-54/108-136/138-174 MHz
UHF:380-512 MHz

PLEASE READ BEFORE USING THIS EQUIPMENT



*TRADEMARKS OF RADIO SHACK
DIVISION, TANDY CORPORATION

REALISTIC®

CARACTÉRISTIQUES

Le récepteur à balayage programmable PRO-2021 de Realistic permet de se tenir au courant de tous les événements d'une région! Il permet d'accéder directement à 23,000 fréquences réparties dans neuf gammes englobant les radios amateurs, les services publics, les avions et les services de transport. On peut programmer le PRO-2021 pour qu'il balaie jusqu'à 200 canaux de façon qu'on ne risque pas de manquer des informations importantes!

Le secret du PRO-2021 réside dans son microprocesseur de conception spéciale. Le clavier permet d'entrer et de changer facilement les fréquences. Le microprocesseur permet aussi de disposer de fonctions spéciales, inconnues avec les autres récepteurs à balayage. Si l'on s'intéresse aux événements dans la région, le PRO-2021 peut rechercher automatiquement les stations en service dans des gammes de fréquence choisies. On peut ainsi facilement localiser des stations et des services nouveaux!

La touche de priorité permet de ne jamais manquer les communications sur une fréquence particulière. Quand on écoute ou explore d'autres canaux, le PRO-2021 passe automatiquement au canal prioritaire en cas de réception.

Les performances supérieures du PRO-2021 s'expliquent par l'utilisation des tout derniers progrès de la technologie des semi-conducteurs. En plus du microprocesseur, le PRO-2021 est équipé d'un circuit intégré à boucle d'accrochage de phase (PLL), de 4 circuits intégrés à semi-conducteurs en métal-oxyde complémentaire (C-MOS), de 6 circuits intégrés, de 30 transistors, de 58 diodes et d'un affichage à cristaux liquides.

Le récepteur portatif à balayage PRO-2021 possède de nombreuses caractéristiques:

- Gammes reçues:
 - 30 — 60 MHz (VHF basse)
 - 50 — 54 MHz (radios amateurs, 6 m)
 - 108 — 136 MHz (avions)
 - 138 — 144 MHz
 - 144 — 148 MHz (radios amateurs, 2 m)
 - 148 — 174 MHz (VHF haute)
 - 380 — 450 MHz (radios amateurs)
 - 450 — 470 MHz (UHF basse)
 - 470 — 512 MHz (UHF haute)

Soit un total de 23,684 fréquences!

- 200 canaux pour la mémorisation des fréquences.
- Possibilité de mémorisation de 10 fréquences localisées pendant la recherche dans les canaux du bloc de contrôle.
- Transfert rapide du bloc de contrôle aux blocs de mémoire permanente.
- Grand affichage à LCD indiquant les fréquences et canaux explorés, contrôlés ou programmés, ainsi que l'état des canaux et le mode d'utilisation du PRO-2021
- Exclusion de canal avec circuit de saut incorporé

**AVERTISSEMENT: POUR ÉVITER
TOUT RISQUE D'INCENDIE OU
D'ELECTROCUTION, NE PAS
EXPOSER CET APPAREIL À
LA PLUIE OU L'HUMIDITÉ.**

- Provides an optional two-second scan delay to eliminate missed replies on any channel
- Sharp reception with a crystal filter for 1st IF (10.7 MHz) and a ceramic filter for 2nd IF (455 kHz)
- AC and DC (negative ground) operation
- Holds memorized frequencies with battery backup
- Universal Mounting Bracket for mobile installation

CAUTION:

TO PREVENT ELECTRIC SHOCK
DO NOT USE THIS (POLARIZED)
PLUG WITH AN EXTENSION
CORD, RECEPTACLE OR OTHER
OUTLET UNLESS THE BLADES
CAN BE FULLY INSERTED TO
PREVENT BLADE EXPOSURE.

Use of this unit for reception of radio communications not intended for direct reception by the general public may be subject to licensing requirements under the Radio Act of Canada and its regulations. For licensing information consult the Department of Communications.

CONTENTS

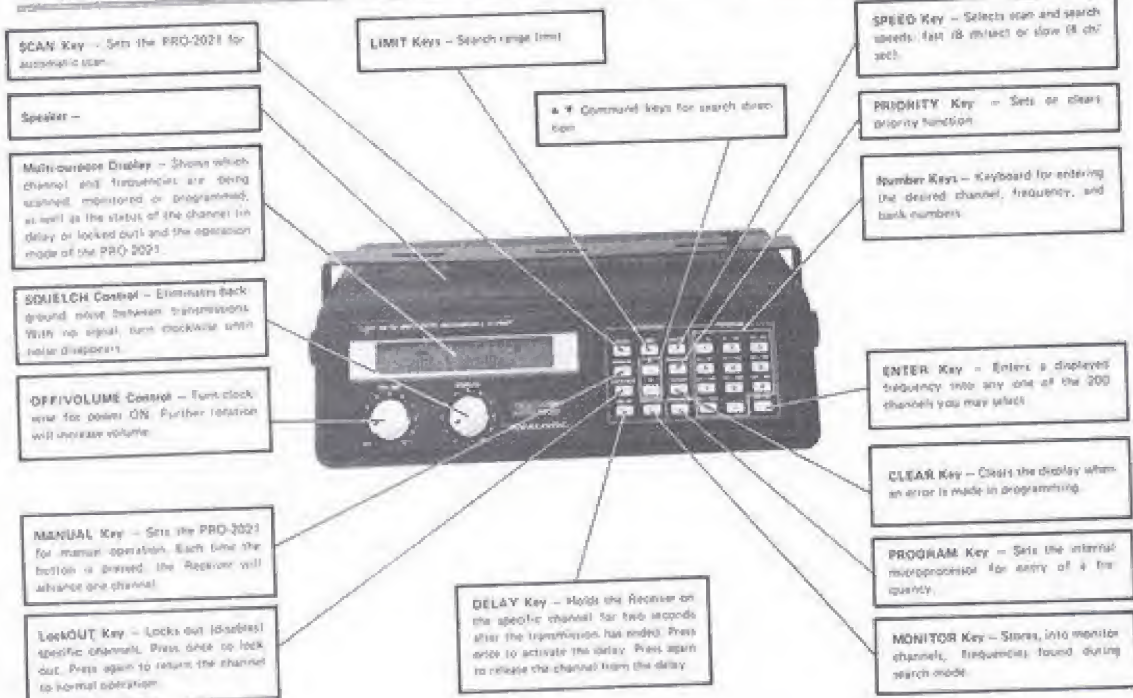
A Quick Look at Your PRO-2021	4-5
Getting Started	6
Operating Your PRO-2021	10-12
Operating Modes	13
Programming Frequencies	13
Hints and Tips for Programming	14
Manual Mode	15
Scanning Frequencies	15
Delay	15-16
Locking Out Frequencies	16-17
Skipping Banks	17
Priority	17-19
Searching with Your PRO-2021	19-20
Using Delay	21
Storing Frequencies in Monitor Channels	21-22
Moving Frequencies to Permanent-Memory	22-23
Birdies	24
Maintenance	25
Before You Call for Help	26
Types of Signals You Will Be Able to Monitor	27-28
Specifications	29
Block Diagram	30

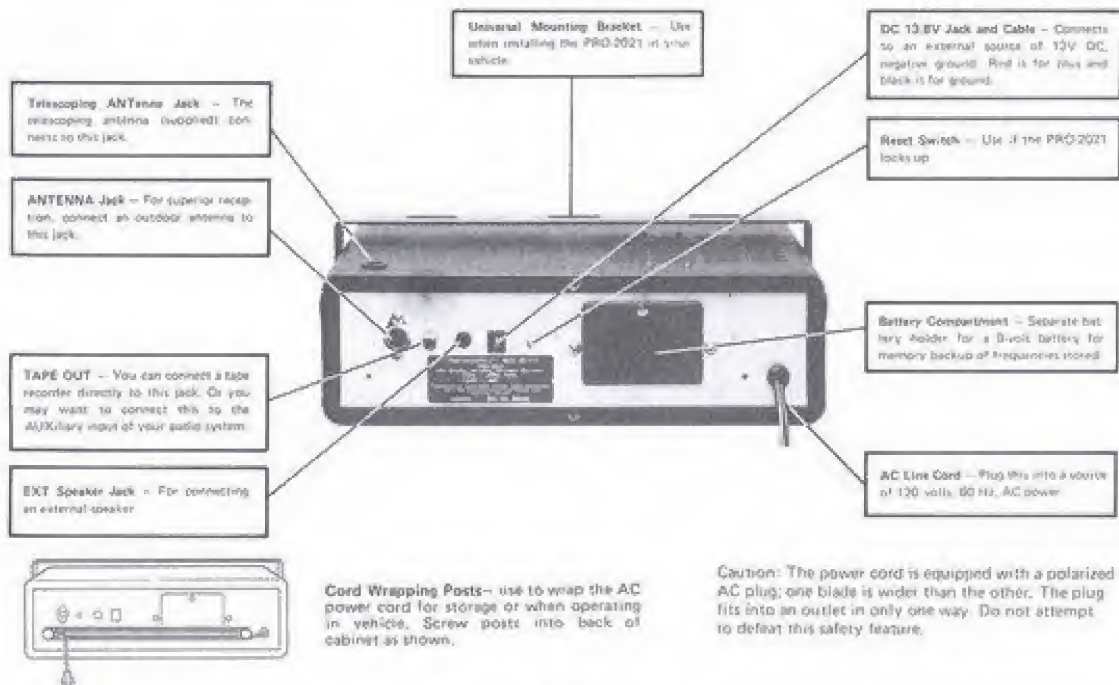
For your own protection, please record your scanner's serial number in the box below. You'll find serial number on the rear panel of the unit.

Serial Number



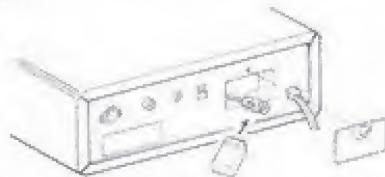
A QUICK LOOK AT YOUR PRO-2021





GETTING STARTED

Loosen the screw and remove the battery compartment cover; then snap in a 9-volt battery. (We recommend a Radio Shack long-life alkaline battery, 23-553 or equivalent.) Your PRO-2021 contains an electronic memory to preserve the 200 programmed scanner channels. The battery protects this memory during AC or DC power failure, or when you have the set unplugged.



Your PRO-2021 can keep channels stored in its memory for a short period of time even with the AC cord unplugged and the 9-volt battery disconnected. (This is so you can replace the battery with the AC cord unplugged, without losing all the programmed information.) For the best results, replace the battery every six months. Also note that battery life will be lessened from 6 months to about 3 months when AC or DC power is left off for a prolonged period. With the power switch on **BATT** flashes slowly, if the voltage is low or there is no battery installed.

RESET Switch

When the LCD shows random display or no display at all, press this switch to clear the PRO-2021. With power turned on, press the switch with a ball-point pen or similar object. Note however, **all the memories stored in your PRO-2021 will be cleared** by the reset and your scanner will have to be reprogrammed. You may also have to use this switch when the time comes for replacement of memory backup batteries.

External Speaker

If you have difficulty hearing in a noisy area, plug an external speaker into the EXT SPKR jack. This will automatically disconnect the built-in speaker. For greater clarity in noisy locations, we recommend the use of our extension-speaker assembly, Cat. No. 21-549.

Auxiliary Unit Connection

You may connect the TAPE OUT Jack to the line input of your cassette deck for direct recording. Or, for greater clarity, you can connect the output to the auxiliary input of your audio equipment.

BASE INSTALLATION

Your PRO-2021 comes with a Telescopic Antenna. Insert it into the Telescopic Antenna jack on the top of your PRO-2021, and screw it into place. Extend to its full length.

In any communications receiver installation, the antenna is one of the most important parts of the setup. Although the telescopic antenna we've included will be adequate for strong local signals, the best reception will result from a multi-band outdoor antenna. It should be mounted as high as possible because the VHF and UHF signals your Receiver picks up travel in a straight line. The higher your antenna, the better your reception. Your local Radio Shack has an excellent antennas for both VHF and UHF reception (Cat. No. 20-014). You can also find mounting hardware, cables and connectors from Radio Shack.



Connect your Receiver to a standard 120-volt AC wall outlet.

WARNING WARNING WARNING

When installing or removing base station antennas, use extreme caution. If the antenna starts to fall, let it go! It could contact overhead power lines. If the antenna touches the power line, contact with the antenna, mast, cable or guy wires can cause electrocution and death! Call the power company to remove the antenna. Do not attempt to do so yourself.

MOBILE INSTALLATION

Safety and operating convenience are the primary factors to consider when you install any equipment in a vehicle. Be sure you can easily reach the Receiver's controls. Also, be sure the connecting cables do not interfere with the operation of the vehicle (brake, accelerator, etc.).

You can mount the Receiver to the underside of the dash or instrument panel in the vehicle. Use the universal mounting bracket provided. Take care when drilling holes that you do not drill into existing wires or trim.

The PRO-2021 is designed to operate from a negative ground 12-volt DC source. When you connect the power leads, be sure to observe correct polarity. Use the DC power cable provided. Insert the plug into the jack on the Scanner. The other end of these wires (red and black) can be connected to the Auto Cigarette-Lighter Plug, Radio Shack's Catalog Number 274-331. Or you can make the connections directly to the fuse block of the vehicle. Be sure to observe correct voltage polarity, red to "+" and black to "-". Refer to the back of the card holding the 274-331 for correct connections to the cigarette-lighter plug.

Caution: The use of a scanner in a mobile unit, may be unlawful or require a permit in some areas. Check with your local authorities.

Mobile Antenna

There are several mounting positions on a car. Three of the most popular locations for mounting antennas are shown below.



Keep the following points in mind when installing your mobile antenna.

1. Mount it rigidly, so it will remain vertical while in motion.
2. Mount as far as possible from the engine compartment.

Mobile Noise Suppression

Your PRO-2021 is a very sensitive receiver, and will pick up even extremely weak signals. This means that in addition to the tiny radio signals, radio-frequency noise may also be picked up and amplified.

In a mobile installation, it is important that you take steps to reduce the amount of noise that finds its way into the Receiver. If you take some or all of the steps recommended below, your reception should be quite satisfactory for mobile use.

Electrical System

Generally speaking, noise can be generated by any device or connection that carries electrical current. Any device that generates a spark should also be suspected. Bypass any suspected wire to ground with a high quality 1 μ F coaxial capacitor.

A very common source of noise is the generator or alternator. This type of noise will sound like a musical whine, and will vary with speed of the engine. Generator and alternator noise can usually be reduced by connecting a coaxial-type capacitor from the armature terminal to the metal case.

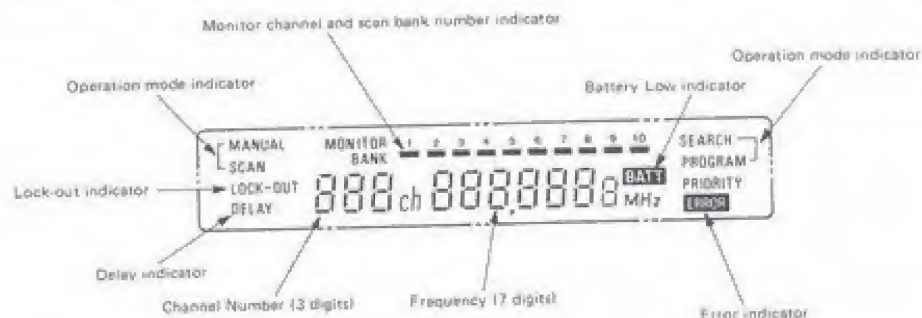
Ignition System

The ignition system is the most common source of noise. This noise can be identified by the fact that its speed varies with the engine speed. Ignition noise will sound like a series of "popping" sounds, while the engine is idling, and will speed up to a buzzing sound as engine speed is increased.

There are a number of things that can be done for this type of noise.

1. Use radio suppression-type ignition wire and resistor spark plugs.
2. Check high-voltage wiring for leakage, cracks, etc. Replace any wiring.
3. In extreme cases, obtain an ignition noise suppression kit — it should shield all ignition wiring. This will provide maximum noise suppression.

OPERATING YOUR PRO-2021



Turn on your PRO-2021 by rotating OFF/VOLUME clockwise. When first turned on, the display lights up. Your PRO-2021 might start scanning.

Rotate SQUELCH fully counterclockwise. You'll hear a rushing noise from the speaker — if not, rotate VOLUME a little further clockwise — and the scanning will stop. Slowly rotate SQUELCH clockwise until the noise stops (and scanning resumes). You are now ready to start entering frequencies.

Understanding the Display and Keyboard

The liquid crystal display (LCD) on your PRO-2021 displays the channel number, the frequency being received, status of different functions, **DELAY** or **LOCK OUT**, and current operation mode. The illustration shows the location of the symbols. As they move on and off the display, you can see which mode of operation is engaged.

On the display, the line under the bank number shows you which bank you are working with. The white numerals above the bank number on the key-board show you the channel numbers in each bank. Bank 1 holds channels numbered 1 through 20, bank 2 holds 21 through 40, and so on through bank 10, which holds the channels 181 through 200.

BATTery Low Indicator

When the battery power becomes low, the BATT appears on the display and the PRO-2021 gives off an alarm sound. Replace the battery.

ERROR Indicator

Sometimes when you try to enter a frequency for a channel or as a search range limit, you will find an ERROR on the display and hear three beeps. This means the frequency is in error and you won't be able to enter it into your PRO-2021.

Such frequency errors usually mean you've entered a frequency outside the ranges your PRO-2021 operates on, such as 225.00 MHz or you've put the decimal point in the wrong place, for example 14.682 MHz

instead of 146.82 MHz. Check carefully to find your mistake and then press **CLEAR**. You can now enter the correct frequency.

The ERROR indicator also appears when you try to enter a channel number outside the PRO-2021's operation, such as channel 250.

Note: All the settings of delay/lockout/speed/priority/skipping banks are retained when you turn power off. The next time you turn the PRO-2021 on, the same settings as when you turned the unit off are still in effect.

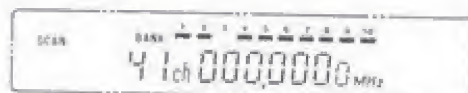
About those Banks . . .

The PRO-2021 has ten banks for storage, plus an eleventh bank for temporary storage. Think of it this way, like storing gold in a bank. You have so much gold one safety deposit box cannot hold it all. So you rent additional safety deposit boxes. When you have filled all the boxes in one bank, you put the spill over into another bank.

Suppose you are still searching for additional gold. If you are undecided about the disposition of a gold strike, whether to store it or spend it, you can place it in a special services bank for temporary storage.

Permanent-Memory Storage Banks

Your PRO-2021 has a comparable storage system for radio frequencies. It has 10 banks and each bank has 20 storage compartments (like safety deposit boxes) which are called **channels**. Into each bank you can safely deposit as many as 20 frequencies. Because there are 10 banks with 20 channels each, you can ultimately store a total of 200 frequencies. The white numbers on the keyboard indicate which channels are allocated to each bank. When the frequencies have been stored, you can scan the banks to find a specific channel.

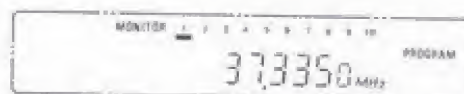


Temporary-Memory Storage Bank

In the search mode, when you discover a new frequency, you can place it in the temporary storage bank. Think of this eleventh bank, special services bank, as the **MONITOR Bank**. It not only helps you, in a rapid search, store new frequencies, it also performs rapid transfer to any of the other ten banks. On the display, **MONITOR** indicates that you have moved to this bank. When in the monitor mode, the ten numbers at the top of the display represent ten channels in which newly-discovered frequencies may be stored temporarily.

Note: Monitoring can only be accomplished in conjunction with "search." See "Storing Frequencies in Monitor Channels."

The underline symbol indicates the channel in which the frequency will be stored.



Operating Modes

There are four separate operating modes on the PRO-2021 . . . programming - manual operation - scanning - searching.

Programming Frequencies

The programming of the PRO-2021 is as simple as 1-2-3-4.

1. Select the desired channel.
2. Press **PROGRAM** to enter programming mode.
3. Enter the desired frequency.
4. Press **ENTER**.

Example for Programming a Frequency (frequency 162.55 MHz into channel 20)

Select the channel in one of three ways:

Step 1.

a. Press **MANUAL**. Continue pressing until the display shows channel 20. Press **PROGRAM**.

b. Press **2** **0** **MANUAL**. Press **PROGRAM**.

-or-

c.

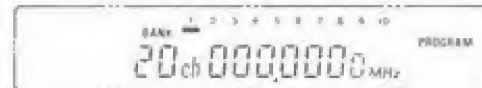
Press **PROGRAM**.



Press **2** **0**



Press **PROGRAM**.



Step 2.

Press the keys 1 6 2 . 5 5



Step 3.

Press **ENTER**



To program the next frequency, move to another channel in this way.

Press **PROGRAM** to advance to the next channel.



Repeat the same steps to add more frequencies.

Hints and Tips for Programming

When you make a mistake while entering a number, press **CLEAR** and re-enter the correct frequency.

If you enter a frequency that is outside a PRO-2021 band range, **ERROR** indicator lights with a beeping sound. Press **CLEAR** and select another frequency.

Any frequency within a PRO-2021 band range will be accepted. However the frequency that can be stored into PRO-2021 memory is in 5 kHz step in the VHF Low/Hi bands, 25 kHz step in the AIR bands and 12.5 kHz step in the UHF bands. The scanner will automatically round off the entered frequency to the closest valid frequency. For example, if you enter 125.2345 MHz, the PRO-2021 will accept this entry as 125.2250 MHz. Or the entry 398.2630 MHz will be treated as 398.2625 MHz.

The tuning range of your PRO-2021 is permanently stored in the microprocessor chip. There's no way it can be extended or altered — even by a skilled electronics technician. So if you try to enter a frequency not in the PRO-2021's tuning range, you will get an error message every time.

If you want to change the frequency entered for a specific channel, enter the new frequency over the old one, following the steps under **Programming Frequencies**.

Manual Mode

When you want to stay on a frequency, either in scan mode or search mode, press **MANUAL**. In the manual mode, you can manually advance through the memory channels by pressing **MANUAL** repeatedly. Or enter the channel number and press **MANUAL** to reach the desired channel directly. Also note that in manual mode you can access locked out channel(s) or skipped bank(s).

Scanning Frequencies

Press **SCAN**. Your PRO-2021 will automatically scan all the channels you have programmed and stop whenever it finds a signal.

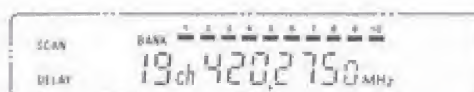
Important! Your PRO-2021 won't scan unless SQUELCH is set to the point where no sound is heard between transmissions, that is, no "hiss" sound.

To stop scanning, press **MANUAL**. To select a specific channel number, enter the number on the keyboard. Then press **MANUAL**. Or press **MANUAL** and continue pressing until you reach the frequency you want.

Delay

In the scanning mode, your PRO-2021 will stop when it finds a channel with a signal. When the signal ends, it immediately begins scanning other channels. Most transmissions are part of a two-way communication with pauses between transmissions.

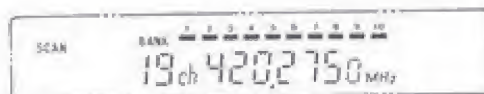
Press **DELAY** when you wish to hold a channel you are listening to.



Your PRO-2021 will then hold the channel at least two seconds after each transmission, giving you time to listen.

DELAY appears on the LCD to show that the delay function is engaged for the selected channel.

To release the delay function, press **DELAY** again. It disappears from the display.



Speed Selection

When the power switch is turned on, the scan speed is set to 8 channels per second.

Pressing **SPEED** alternates the scan speed between 4 channels per second and 8 channels per second.

Locking Out Frequencies (Skipping Frequencies)

You might want your PRO-2021 to skip certain frequencies while it's scanning, such as continuously transmitted weather broadcasts. To lock out such channels, follow these steps:

1. Press **MANUAL** to stop scanning.
2. Continue pressing **MANUAL** until you reach the channel you want to lock out. If you know the channel number(s), this can be done more quickly. Enter the channel number then press **MANUAL**.
3. Press **LOCK OUT**. LOCK-OUT appears on the display, indicating this channel will be skipped during scanning.

Note: In manual scanning you can access the locked out channel(s).

To release the lockout function:

1. Press **MANUAL** to stop scanning.
2. Advance to the channel that is locked out.
3. Press **LOCK OUT** again. LOCK-OUT disappears from the display.

You can lock out as many channel as you like. But there must be at least one channel that is not locked out in each bank. The last channel in a bank cannot be locked out.

Skipping Banks

At initial "power on," all the banks are available to be scanned. You can skip one entire bank while scanning. This is convenient when there are no frequencies entered in the bank. There is no need to scan through it. You do not use the LOCKOUT key to skip Banks. Instead, you follow this procedure:

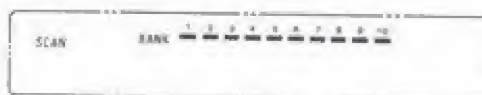
Turn power on.

Press the number key that corresponds to the bank to be skipped.



The corresponding bank number indicator disappears from the display and the entire bank is skipped.

Press the number key again to restore the bank.



Each number on the keyboard has figures in white: these figures show the channel numbers that are allocated to that particular bank.

As with the lockout function, you cannot skip all the banks. The "last" bank cannot be skipped.

Priority

You may scan other channels and still not miss a transmission of special interest to you. If a call is received on the priority channel while you are scanning other channels, your PRO-2021 will automatically switch to the priority channel.

Programming Priority

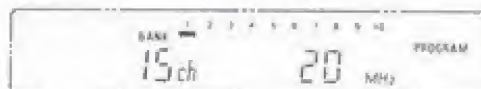
At initial "power on," channel 1 is set as the priority channel. So if you enter the frequency of particular interest in channel 1, you need not set the priority channel.

If you want to use another channel as the priority channel, press **[PROGRAM]**, enter the channel number and press **[PRIORITY]**. Only one channel is set as the priority channel. If you enter a new priority channel, the previous priority channel is automatically cleared of its PRIORITY function.

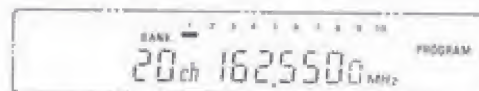
Press **[PROGRAM]**.



Press the channel number **[2]** **[0]**.



Press **[PRIORITY]**.

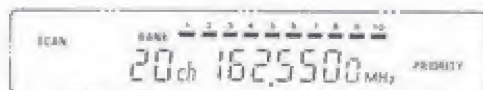


You can verify the priority channel by pressing **[PROGRAM]** then **[PRIORITY]**. The Ch on the display blinks when you scan the priority channel.

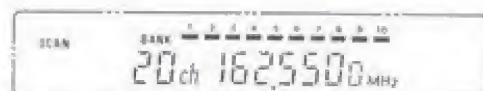
Using Priority

The priority function is available only in scan or manual mode. Press **[PRIORITY]** to activate this function. PRIORITY appears on the display. The Receiver will check the priority channel and switch it if a signal is received on it.

Press **PRIORITY**.



To cancel priority, press **PRIORITY** again.
PRIORITY disappears from the display.



Note: All the settings of delay/lockout/speed/priority/skipping banks are retained even when you turn power off. The next time you turn the power on, the same settings, as when you turned the PRO-2021 off, are in effect.

Searching with Your PRO-2021

To search for transmission, press **PROGRAM**, enter limits of frequency range, and press **▲** or **▼** to activate "search."

Press **PROGRAM**.



Press **LIMIT**.



Enter the lower limit of frequency range to be searched.



Press **ENTER**.

--- 452,6250 MHz PROGRAM

Press **LIMIT**.

--- 452,6250 MHz PROGRAM

Enter the upper limit of frequency range to be searched.

--- 452,975 MHz PROGRAM

Press **ENTER**.

--- 452,9750 MHz PROGRAM

Activate "search" by pressing **▲** or **▼**. **▼** starts search from the highest frequency and goes down.

SEARCH
--- 452,9750 MHz
○
SEARCH
--- 452,6500 MHz
↓
SEARCH
--- 452,6370 MHz
↓
SEARCH
--- 452,6250 MHz

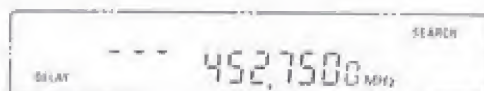
▲ moves in the opposite direction.

Press **SPEED** to accelerate or to slow down the search.

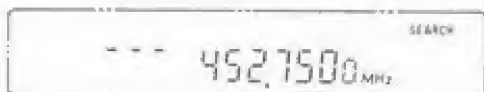
Using DELAY

Search stops when a signal is picked up on a frequency. As soon as the signal ends, searching resumes. Most transmissions are part of a two-way communication. Delay allows for pauses between transmissions.

Press **DELAY** when you wish to stay with a frequency. Your PRO-2021 will hold the frequency at least 2 seconds after each transmission — giving you time to listen.



To release the delay function, press **DELAY** again.



If you wish to restart the search function before the transmission ends, you can do so by first pressing **LIMIT** then either **▲** or **▼**.

To re-program the frequency range press **PROGRAM**: press **LIMIT**. Each depression of **LIMIT** moves the **----** up or down on the display. When **----** is at the bottom of the display, enter the lower frequency. When **----** is at the top, enter the upper frequency. Press **ENTER** to lock it in memory.

Storing Frequencies in Monitor Channels

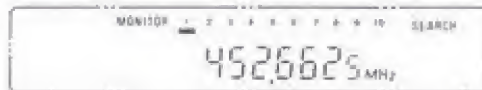
Your PRO-2021's Temporary-Memory Storage Bank has 10 monitor channels. During search, you can store one frequency to each channel.

1. To search for transmissions, press **PROGRAM**. The 10 numbers at the top of the display now function as channels in which new frequencies may be placed for temporary storage. Enter limits of frequency range, and press **▲** or **▼** to activate "search."

2. When the search stops on a frequency you want, to store it press **MONITOR**.

This freezes search. And records the frequency in one of the monitor channels.

The display shows the channels. The channel with the underline holds the stored frequency.



3. Press **▲** or **▼** to resume search. If you find another frequency of interest, press **MONITOR** again to store it in the next monitor channel.

Repeat the steps to store the desired frequencies in the monitor channels, 1 through 10. If you repeat the step beyond the tenth channel, the channel reverts to 1, and you will write the new frequency over the old one, and the old frequency will be erased.

Moving Frequencies from Monitor Channels to Permanent Memory

You can move a frequency from a monitor channel to permanent storage by simply pressing **ENTER**. You do not have to write down the frequency and then enter it number by number.

First, select the channel in which you wish to store the newly-found frequency. Second, recall the monitored frequency to the display. Third, press **ENTER** to store the frequency in permanent memory.

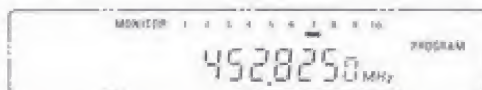
1. Press **PROGRAM**.

Select the channel number you want to use. Then press **PROGRAM**.

2. Press **MONITOR**.



3. Press **MONITOR** as many time as required to arrive at the monitor channel that contains the frequency you want moved to permanent storage. Or, because you are now in the monitor mode, you may use the keyboard to select the number of the monitor channel. You will see the frequency that you want moved on the display.



4. Press **ENTER**. This entry programs the frequency into the permanent-memory channel.



5. If you want to store more frequencies, select another memory channel by keying in the number and **PROGRAM**. Then follow step 2 through 4 above.

The frequencies in the monitor channels will remain unchanged until you wish to search for, and enter new frequencies.

When you wish to verify the transfers, return to the permanent-memory display by pressing **MANUAL**. The display shows you have returned to the normal mode. The word, BANK, appears at the top of the display. Press channel number and **MANUAL** to check the memory content in a specific channel.

Birdies

"Birdies" are the products of internally generated signals that make some frequencies difficult or impossible to receive. If you program one of these, the Receiver locks up and you'll hear only noise on that frequency.

If the interference is not severe, you might be able to rotate SQUELCH clockwise to cut out the birdie. The most common "birdies" to watch out for are listed.

Even with the SQUELCH control set to maximum (fully clockwise), scanning may stop on or around some of these frequencies. If the signal is strong enough (above 10 μ V in technical terms) you can listen for transmissions on the channel. But you will have to use MANUAL to move off the troublesome frequency.

Birdies Frequencies

32.000 MHz	108.400 MHz	147.625 MHz
34.040 MHz	115.200 MHz	to
38.400 MHz	121.600 MHz	147.700 MHz
44.800 MHz	126.200 MHz	153.600 MHz
	to	160.000 MHz
	126.300 MHz	166.400 MHz
	128.000 MHz	
	134.400 MHz	

MAINTENANCE

Your PRO-2021 represents a fine example of electronic engineering and construction. As such it should be treated accordingly. We offer the following suggestions so you will enjoy this product for many years to come.

If at anytime you suspect that your unit is not performing as it should, stop by your local Radio Shack store. Our personnel are there to assist you and arrange for service, if needed.



Keep it dry. If water should get on it, wipe it off immediately. Water contains minerals that can corrode electronic circuits.



Do not store in hot areas. High temperatures can shorten the life of electronic devices, damage batteries, and can even distort or melt certain plastics.



Do not drop your product. This will likely result in failure to operate. Circuit boards can crack and cases may not survive the impact. Handling your product roughly will shorten its useful life.



Do not use or store in areas of high levels of dirt or dust. The electronics may be contaminated. Any moving parts will wear prematurely.



Do not use harsh chemicals, cleaning solvents or strong detergents to keep your unit looking new. You need only wipe it with a dampened cloth from time to time.



Always make sure any batteries used are fresh and are of the correct type. Never use general purpose batteries if alkaline cells are called for. Old or almost-dead batteries are also dangerous. A worn out battery can leak chemicals which will destroy electronic circuits.

BEFORE YOU CALL FOR HELP

The 9-volt battery used to maintain the program memory should be replaced every 6 months. Be sure the unit is plugged into a source of power during battery replacement. Use only a long-life alkaline battery, such as our 23-553.

Check memory contents after replacing batteries. If the memory has been lost, press the RESET button and re-enter the frequencies.

If you have problems . . .

We hope you don't — but here are some suggestions:

Problem	Possible Cause	Remedy
Scanner is totally inoperative.	No power	Check to see that the unit is plugged into a working AC outlet or DC power source.
Scanner is on, but will not scan.	1) Channels are locked out. 2) Squelch control is not adjusted correctly	1) Press MANUAL, then release each channel from lockout one-by-one. 2) Adjust SQUELCH clockwise.
Scan locks on frequencies having no clear transmission.	"Birdies"	Avoid programming frequencies listed on page 24, or only listen to them in the manual mode.

If none of these suggested remedies solves the problem return your set to your nearby Radio Shack for assistance.

TYPES OF SIGNALS YOU WILL BE ABLE TO MONITOR

Your community is alive with action — action which is constantly being reported on the air waves. And your PRO-2021 will automatically scan the air waves to bring you that action — your police force at work, a fire truck on a mission, sheriff's department, state police, the national weather service, ham radio operators, highway and other emergency-type services, some industrial services, some transportation services (taxi, trucks, railroad), plus some government services. Lots of things are going on that most of us just are never aware of. But, with the right frequencies programmed in your PRO-2021, you can monitor such exciting signals. You'll have to do a little investigation in your community to find out what services are active and on what frequencies. You will find a copy of Radio Shack's "Police Call Radio Directory" most helpful.

What to listen for and where? That is a little difficult for a specific answer. Each area of the country can and will use different channels. All we can do is give you some general pointers and then let you take it from there.

Find out if there is a local club which monitors these frequencies. Often a local electronics repair shop that

does work on the equipment can give you the channel frequencies used by local radio services. A volunteer police or fire employee can also be a good source of this information.

You can hear air navigation between 108 — 118 MHz. Communications between aircraft and airport control towers can be found between 118 — 136 MHz.

As a general rule on VHF-Hi, most activity will be concentrated between 153.785 and 155.98 and then again from 158.73 to 159.46 MHz. Here you'll find local government, police, fire and most emergency services. If you are near a railroad yard or major railroad tracks, look around 160.0 to 161.9 for them.

In some of the larger cities, there has been a move to the UHF bands for emergency services. Here, most of the activity is in a spread of 453.05 — 453.95 and again at 456.025 — 459.95 MHz.

In the UHF band, the overall spread of 456.025 – 459.95 and again at 465.025 – 469.975 MHz is used by mobile units and control stations associated with base and repeater units which operate 5 MHz lower (that is, 451.025 – 454.95 and 460.025 – 464.975 MHz). This means that if you find an active channel inside one of these spreads, you can look 5 MHz lower, or higher as the case may be to find the major base station/repeater for that radio service.

NATIONAL WEATHER SERVICE RECEPTION

Continuous weather broadcasts are transmitted 24 hours a day in many parts of the country. Your PRO-2021 will automatically lock in on one of the channels assigned (162.55, 162.40, 162.475 MHz), because the broadcasts are continuous. To prevent automatic locking, use the channel lockout feature on the weather channel. The first three channels are the weather channel. The first three channels are the most widely used frequencies. The remaining four are in use in some areas. When you want a weather report access the weather channel in the Manual mode. In areas where stations are close to each other, one will use 162.55, another will use 162.40, and a third might use 162.475 MHz. Check with your local DOC office or the National Weather Service for the frequency used in your area. You can also write to:

SPECIFICATIONS

FREQUENCY COVERAGE:

VHF-Lo 30-50 MHz (in 5 kHz steps)
 Ham 50-54 MHz (in 5 kHz steps)
 Aircraft 108-136 MHz (in 25 kHz steps)
 138-144 MHz (in 5 kHz steps)
 Ham 144-148 MHz (in 5 kHz steps)
 VHF-Hi 148-174 MHz (in 5 kHz steps)
 Ham 380-450 MHz (in 12.5 kHz steps)
 UHF-Lo 450-470 MHz (in 12.5 kHz steps)
 UHF-Hi ("T") 470-512 MHz (in 12.5 kHz steps)

CHANNELS OF OPERATION:

Any 200 channels in any band combinations (20 channels x 10 Banks) and 10 Monitor channels.

SENSITIVITY:

AM: 20 dB Signal-to-Noise ratio at 60 % modulation
 108-136 MHz 2.0 μ V
 FM: 20 dB Signal-to-Noise ratio at 3 kHz deviation
 30- 54 MHz 0.5 μ V
 138-174 MHz 1.0 μ V
 380-512 MHz 1.0 μ V

SPURIOUS REJECTION:

30- 54 MHz 50 dB at 40 MHz
 108-136 MHz 50 dB at 120 MHz
 138-174 MHz 50 dB at 154 MHz
 380-512 MHz Not specified.

SELECTIVITY:

± 9 kHz, -6dB ± 15 kHz, -50 dB

IF REJECTION:

10.7 MHz 60 dB at 154 MHz

SCANNING RATE:

Fast 8 channels/sec. Slow 4 channels/sec.

SEARCH RATE:

Fast 8 steps/sec. Slow 4 steps/sec.

PRIORITY SAMPLING:

2 seconds

DELAY TIME:

2 seconds

MODULATION ACCEPTANCE:

± 8 kHz

IF FREQUENCIES:

10.7 MHz and 455 kHz

FILTERS:

1 crystal filter, 1 ceramic filter

SQUELCH SENSITIVITY:

Threshold Less than 1.0 μ V
 Tight (S+N)/N 25 dB

ANTENNA IMPEDANCE:

50 ohms

AUDIO POWER:

1.5 watts nominal, 1.0 watts limit

BUILT-IN SPEAKER:

77 mm (3") 8 ohm, dynamic type

TAPE OUT (Z=10 kohm):

500 mV nominal, 300 mV limit

POWER REQUIREMENTS:

AC, 120 Volts, 15 watts
 DC, 13.8 Volts, 8 watts
 9 Volt battery for Memory back-up

DIMENSIONS:

80mm (3-1/8") x 260mm (10-2/8") x 200mm (8") HWD

WEIGHT:

2.0 kg (4.4 lbs)

BLOCK DIAGRAM

